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WOODCOCK WASHBURN KURTZ
MACKIEWICZ & NORRIS LLP
ATTENTION: STEVEN J. ROCCI, ESQ.
ONE LIBERTY PLACE, 46TH FLOOR
PHILADELPHIA, PA 19103

EXAMINER	
EHICHIOYA, FRED I	
ART UNIT	PAPER NUMBER
2172	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/783,820	PUDIPEDDI ET AL.	
	Examiner	Art Unit	
	Fred I. Ehichioya	2172	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 - 25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1 - 25 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The application has been examined. Claims 1 – 25 are pending in this office action.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1, 2, 7, 9, 10, 21, 22, 23 and 25 are rejected under 35 U.S.C 102(e) as been anticipated by U.S. Patent 6,279,074 issued to Jerry Wayne Pence (hereafter "Pence").

Regarding claim 1, Pence teaches a method of recalling data objects stored on a plurality of media

comprising:

receiving a plurality of requests to recall data objects, each data object being located on a particular one of said plurality of media ("handling recall requests for data maintained in storage devices from a host system", see column 2, lines 56 – 57);

creating a plurality of queues, wherein each one of said queues corresponds to one of said media ("The host system maintains a queue of recall requests to a plurality of storage devices", see column 2, lines 57 – 58);

placing said requests on the created queues ("placing the recall request in the recall queue", see column 6, line 58), wherein each request is placed on the queue corresponding to the medium on which the requested data object is located ("Priority data is associated with each recall request in the queue", see column 2, lines 58 – 59);

activating a first of said queues, said first queue being associated with a first of said plurality of media ("The host system initiates a recall operation for a recall request in the queue to a first storage device mounted in a drive", see column 2, lines 58 – 61); and retrieving, from said first medium, the data objects requested on the first queue ("The recall operation for the next recall request to the first storage device is performed after determining that the next recall request has the higher priority", see column 2, lines 59 – 67).

Regarding claim 2, Pence teaches each queued request indicates the offset from a predetermined location on a medium at which the requested data object is located, and wherein said placing act comprises:

organizing the requests on each queue in a first and a second sequence, each sequence comprising a set of requests whose offsets are monotonically increasing within the respective sequence ("The recall operation for the next recall request to the first storage device is performed after determining that the next recall request has the higher priority. The first storage device is demounted from the drive after determining that the recall request to the second storage device has the higher priority", see column 2, lines 64 – 67 and column 3, lines 1 – 2).

Regarding claim 7, Pence teaches the act of creating a plurality of queues ("The host system maintains a queue of recall requests to a plurality of storage devices", see column 2, lines 57 – 58) comprises timestamping ("A timestamp field 46 indicates the time at which the recall request was initiated", see column 5, lines 51 – 52) each of the created queues ("a host 2 placing the recall request in the recall queue", see column 6, line 58), and wherein the act of activating a first of said plurality of queues comprises selecting a queue to be activated based on the timestamps of the respective queues ("If so, control transfers back to block 90 to perform the recall operation on the next recall request in the queue for the mounted cartridge. Otherwise, control transfers to block 94 to demount the cartridge. As discussed, when the priority data includes the fields described in FIG. 3, the host system 2 would first compare the wait flag fields 42. If the wait flag 42 was the same for the next recall to the mounted cartridge and the highest priority recall to an unmounted cartridge, then the host system 2 would compare the priority value 44. If the priority values 44 are identical, then the host system 2 would compare the time stamp 46 priority value", see column 7, lines 60 – 67 and column 8, lines 1 – 4).

Regarding claim 9, Pence teaches said method is performed in a computing environment comprising a hard disk, said method further comprising ("A primary DASD 8 provides storage of more frequently used volumes and data sets, i.e., level 0 volumes, for access by the host systems 2, 4. In preferred embodiments, the primary DASD 8 is

comprised of relatively high-performance rapid access storage devices, such as a group of hard disk drives", see column 3, lines 59 – 64):

determining that said data objects are not located on said hard disk ("A secondary storage system 10 provides storage of less frequently used data, i.e., level 2 volumes", see column 3, lines 64 – 66).

Claims 10 is essentially the same as claim 1 except that it sets forth the claimed invention as a computer-readable medium having computer-executable instructions rather than a method and therefore rejected for the same reasons as applied hereinabove.

Regarding claim 21, Pence teaches a system for retrieving data objects from a plurality of media comprising:

a queuing module which creates a plurality of queues corresponding to said plurality of media ("The host system maintains a queue of recall requests to a plurality of storage devices", see column 2, lines 57 – 58. The host system creates a queue of recall request), said queuing module receiving requests to retrieve data objects from said plurality of media ("The host system initiates a recall operation for a recall request in the queue to a first storage device mounted in a drive", column 2, lines 59 – 61) and queuing each of said requests on the queue corresponding to the medium on which the requested data object is located ("storage devices 11 Control transfers to block 62 which represents the host system 2 determining whether the recall request is to a

volume on a mounted cartridge to which the host system 2 is currently performing recall operations. If so, control transfers to block 64 which represents the host 2 placing the recall request in the recall queue 50", column 6, lines 53 – 58);

an activation module which selects queues for activation and activates the selected queues ("After demounting the cartridge at block 94, control transfers to block 96 to mount the cartridge for the highest priority recall request in the queue 50 to a tape drive D1-D5 available for recall requests to service this highest priority recall request", column 8, lines 5 - 9); and

a retrieval module which retrieves the items on one of the selected queues from the corresponding medium in the order in which the items are located on the queue ("the host system 2 performs recall requests in the queue for a given cartridge in order of the priority of the requests as indicated by the priority data 28 for the queue recall requests", column 7, lines 48 – 51. The host system 2 performs recall requests performs the same function as a retrieval module which retrieves items on the selected queues.).

Regarding claim 22, Pence teaches a hard disk ("group of hard disks", see column 3, line 64);

a file system ("a file server providing access to the programs via a network transmission line", column 6, lines 35 – 36) which manages files on said hard disk, which stores to information indicating which of said files have been migrated to said media ("A hierarchical storage management system provides mechanisms for migrating less frequently used data from level 0 to level 2 media", column 1, lines 34 – 36), and

which issues a request to said queuing module for requested files that have been migrated to said media ("This provides more space for more frequently used data sets on the level 0 storage devices. If a host system attempts to access data sets maintained in level 2 storage, then software implemented in the host system would automatically cause the recall of the requested data from the level 2 to level 0 storage devices", column 1, lines 37 – 41).

Regarding claim 23, Pence teaches queuing module timestamps each queue at the time that the queue is created ("a time stamp field 46 indicates the time at which the recall request was initiated", column 5, lines 51 – 52; The host system maintains a queue of recall requests to a plurality of storage devices), and wherein said activation module selects a queue for activation based on the timestamps of the created cues ("control transfers back to block 90 to perform the recall operation on the next recall request in the queue for the mounted cartridge. Otherwise, control transfers to block 94 to demount the cartridge. As discussed, when the priority data includes the fields described in FIG. 3, the host system 2 would first compare the wait flag fields 42. If the wait flag 42 was the same for the next recall to the mounted cartridge and the highest priority recall to an unmounted cartridge, then the host system 2 would compare the priority value 44. If the priority values 44 are identical, then the host system 2 would compare the time stamp 46 priority value", column 7, lines 60 – 67 and column 8, lines 1 – 4).

Regarding claim 25, Pence teaches a system for recalling data objects from a plurality of media comprising:

means for receiving requests to recall data ("The host system initiates a recall operation for a recall request in the queue to a first storage device mounted in a drive", column 2, lines 59 – 61);

means for creating a plurality of queues ("The host system maintains a queue of recall requests to a plurality of storage devices", see column 2, lines 57 – 58);

means for placing the requests on said queues according to the media on which the requested data is located ("storage devices 11. Control transfers to block 62 which represents the host system 2 determining whether the recall request is to a volume on a mounted cartridge to which the host system 2 is currently performing recall operations. If so, control transfers to block 64 which represents the host 2 placing the recall request in the recall queue 50", column 6, lines 53 – 58);

means for activating said queues ("Control begins at block 76 which represents the host system 2 initiating an available recall for the highest priority request in the queue", column 7, lines 9 – 13); and

means for retrieving data requested on an activated queue ("host 4, then control transfers to block 66 which represents the host system 2 determining whether there are any available recall drives. If so, control transfers to block 68 which represents the host system 2 mounting the cartridge into the drive and performing the recall request to that mounted drive. If there are no available recall drives, then the host system 2 places the recall request in the queue 50", column 6, lines 61 – 67).

4. Claims 11, 12, 14, 15 are rejected under 35 U.S.C 102(e) as been anticipated by U.S. Patent 6,272,605 issued to Le et al (hereinafter "Le").

Regarding claim 11, Le teaches In a computing environment having a first plurality of drives in which data objects to be retrieved are stored on a second plurality of media mountable on said drives, a method of obtaining data objects from said media comprising:

identifying a first data object located on a first of said media ("a system for handling recall requests for data maintained in a storage device from multiple host systems. Initially, a storage device is allocated to a first host system to process recall requests in a recall queue including a plurality of recall requests. A second host recall request is initiated with a second host system to recall data from the storage device. The second host system determines whether the storage device is allocated to the first host system", see column 2, lines 61 – 65 and column 3, lines 1 - 2);

identifying a second data object located on a second of said media different from said first medium ("the second host system determines whether the storage device is available and whether the priority of the second host recall request is greater than or equal to the priority data already indicated in the data structure when retrying the second host recall request. The first host system releases the tape if its next recall request has lesser priority than the recall request indicated in the data structure", see column 3, lines 10 – 17); and

concurrently using a first and a second of said drives to retrieve said first and second data objects from said first and second media ("The logic of FIG. 6 allows a second intervening host to recall over a lower priority first requesting host and, at the same time, allow the first requesting host to perform recalls should the second intervening host fail or be slow to respond", see column 9, lines 44 – 48. Concurrently or at the same time, the first and second hosts can perform recall request should either of the host fail or be slow to response).

Regarding claim 12, Le teaches creating a first queue corresponding to said first medium ("Initially, a storage device is allocated to a first host system to process recall requests in a recall queue including a plurality of recall requests", see column 2, lines 61 – 65);

placing first data on said first queue, said first data being indicative of said first data object ("Initially, a storage device is allocated to a first host system to process recall requests in a recall queue including a plurality of recall requests", see column 2, lines 63 – 65);

creating a second queue corresponding to said second medium ("A second host recall request is initiated with a second host system to recall data from the storage device", see column 2, lines 65 – 67); and

placing second data on said second queue, said second data being indicative of said second data object (the second host system stores priority data in a data structure indicating a priority of the second host recall request", see column 3, lines 2 – 4).

Regarding claim 14, Le teaches identifying a third data object located on a third of said media ("storing priority data in the data structure with the third host system indicating a priority of the third host recall request", see column 12, lines 36 – 38);

waiting for said first or said second data object to be retrieved from their respective media ("retrying the second host recall request after setting the flag, wherein the second host retries the second host recall request", see column 12, lines 47 – 49); and

retrieving said third data object from said third medium ("a third host system attempting a third host recall request", see column 12, lines 33).

Claims 15 is essentially the same as claim 11 except that it sets forth the claimed invention as a computer-readable medium having computer-executable instructions rather than a method and therefore rejected for the same reasons as applied hereinabove.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> **(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.**

6. Claims 3, 4, 5, 6, 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pence in view of U.S. Patent 6,490,666 issued to Cabrera et al (hereinafter "Cabrera").

Regarding claim 3, Pence teaches activating a second of said queues, said second queue being associated with a second of said plurality of media, the second medium being different from said first medium ("The second storage device to the drive is mounted after demounting the first storage device from the drive. The recall operation for the recall request to the second storage device is then performed", see column 3, lines 3 – 4); and

retrieving, from said second medium, the data objects requested on the second queue ("The recall operation for the recall request to the second storage device is then performed", see column 3, lines 4 - 6).

Pence does not explicitly teach the retrieval occurring at least in part concurrently with the retrieval of data objects from the first medium.

Cabrera teaches the retrieval occurring at least in part concurrently with the retrieval of data objects from the first medium ("Multiple threads may access the requested data concurrently from the same data buffer. Furthermore, multiple data buffers may be used to concurrently buffer different portions of the same file", see column 9, lines 10 – 13).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of Pence combine with the teaching of Cabrera wherein one or more threads can repeatedly and alternately access different portions of the same file located in different data blocks by "ping-ponging" between two data buffers without repeatedly retrieving the alternating data blocks from a secondary storage device.

Regarding claim 4, Pence does not explicitly teach each of said queue comprises a linked list of requests

Cabrera teaches each of said queue comprises a linked list of requests ("The buffer headers are organized in the LRU 301 as a doubly linked list forming a circular queue, as shown in FIG. 3. Although only five headers and five data buffers are shown in FIG. 3", see column 7, lines 12 – 14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of Pence combine with the teaching of Cabrera wherein linked list forms a circular queue. Each buffer header points to a data buffer which is aligned in the memory to maximize transfer rates.

Regarding claim 5, Pence does not explicitly teach querying a database to determine the locations of the requested data objects

Cabrera teaches querying a database to determine the locations of the requested data objects ("For a tape, such positioning typically involves the mechanical winding and/or rewinding of the media to locate the proper location of requested data on the tape", see column 2, lines 37 – 41).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of Pence combine with the teaching of Cabrera wherein locating or querying for a specific data offset a costly operation in the overall process of retrieving data from a sequential access storage medium.

Regarding claim 6, Cabrera teaches the location provided by said database comprises a media identifier and an offset into the identified medium ("As such, positioning to a specified data offset on the tape presents a costly operation in the overall process of retrieving recorded data from a sequential access storage medium", see column 2, lines 41 – 44).

Regarding claim 8, Pence teaches said method being performed in a multi threaded environment wherein plural threads execute concurrently, said method further comprising:

placing a request on a queue ("a host 2 placing the recall request in the recall queue", see column 6, line 58); and

changing a queue from a non-active state to an active state ("FIG. 6 illustrates logic implemented in the host systems 2, 4 to service recall requests in a queue of recall requests to mounted and unmounted cartridges. Control begins at block 76 which represents the host system 2 initiating an available recall for the highest priority request in the queue. In preferred embodiments, additional recalls for the mounted tape are started independent of priority until a predetermined time for processing recall requests for the mounted tape has lapsed. Control transfers to block 80 which represents the host system 2 performing recall requests with respect to a particular storage cartridge for a specified period of time", see column 7, lines 8 – 18).

Pence does not explicitly teach acquiring a lock prior to performing an action selected from the group consisting of:

said lock being acquirable by only one of said threads at a given time; and releasing said lock subsequent to performing an action in said group.

Cabrera teaches acquiring a lock prior to performing an action selected from the group consisting of ("the process obtains an exclusive lock to prevent other processes from reading or writing data from the data buffer during transfer", see column 9, lines 56 – 58):

said lock being acquirable by only one of said threads at a given time ("The LOCK field 504 supports an exclusive lock and a shared lock", column 9, 52 – 53); and

releasing said lock subsequent to performing an action in said group ("the process obtains an exclusive lock to prevent other processes from reading or writing data from the data buffer during the transfer. During this time, the buffer header is also removed from the LRU queue. When a process is reading a data buffer, the process obtains a shared lock to ensure that the data in the data buffer is preserved (i.e., not obtained for a new transfer of data from a secondary storage device) during the read operation", see column 9, lines 56 – 63).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of pence combine with the teaching of Cabrera wherein the locking coordinates multiple user and multiple thread accesses to the buffered data. Recall request are therefore processed in the other of priority.

Regarding claim 24, Pence teaches wherein said queuing module includes logic which maintains the requests ("program logic for searching the queue to locate a highest priority recall request to the unmounted second storage device as indicated from the priority data and determining whether the next recall request to the first storage device has higher priority than the highest priority recall request to the unmounted second storage device by processing the priority data", column 10, lines 59 - 65) on each of said plurality of queues in first and second sequences ("a queue data structure including a plurality of recall requests to the first storage device and priority data associated with each recall request, wherein the host system processes a recall request in the queue data structure to recall data from the one of the first and second storage

devices mounted in the drive", column 10, lines 37 – 41), the offsets of the data objects requested in each of said first and second sequences comprising a maximally monotonically increasing series ("The recall operation for the next recall request to the first storage device is performed after determining that the next recall request has the higher priority. The first storage device is demounted from the drive after determining that the recall request to the second storage device has the higher priority", see column 2, lines 64 – 67 and column 3, lines 1 – 2).

Pence does teach not explicitly teach each requested data object is located at an offset into the medium on which the data object is located.

Cabrera teaches each requested data object is located at an offset into the medium on which the data object is located ("a file offset are passed as parameters to the storage service software) indicating requested data from a file storage on the secondary storage medium", column 10, lines 46 – 48)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of Pence combine with the teaching of Cabrera wherein program logic performs searching the queue to locate a highest priority recall request. This makes the recall request easy and efficient.

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Le in view of Pence .

Regarding claim 13, Le does not explicitly teach first data comprises a location of said first data object on said first medium, and wherein said second data comprises a location of said second data object on said second medium

Pence teaches said first data comprises a location of said first data object on said first medium, and wherein said second data comprises a location of said second data object on said second medium ("A memory location for storing data structures for access by a host system, wherein the host system is in communication with a drive, wherein a first storage device and a second storage device are capable of being mounted in the drive, wherein the host system can perform data access operations on one of the first and second storage devices when mounted in the drive", see column 12, lines 66 – 67 and column 13, lines 1 – 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of Le combine with the teaching of Pence wherein a memory location stores data structures for access and execution by the host system. Storing the data structure on first and second medium respectively reduces the expected wait time during the recall request.

8. Claims 16, 17, 18, 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Le in view of Pence and further in view of Cabrera.

Regarding claim 16, Le teaches a method of scheduling requests to recall data objects from a 16 medium, said medium being mounted on a drive, said drive having a reading head, said 17 method comprising:

receiving a new request to recall a data object from said medium ("a host system initiates a recall request to a volume that is already allocated to a second host system, an inventory control record maintained in the level 0 DASD indicates that a recall task needs the volume", see column 2, lines 7 – 10), said data object being located at a first offset along said medium ("a first memory location accessible to a storage management program being executed on the second host system stores the first data structure", column 16, lines 27 – 30);

identifying a queue comprising a plurality of requests to recall data from said medium ("a storage device is allocated to a first host system to process recall requests in a recall queue including a plurality of recall requests", see column 2, lines 63 – 65), said requests having an order ("retry sequence", column 2, 26),

Pence teaches each of said requests corresponding to a particular data object stored on said medium and indicating an offset into said medium at which the corresponding data object is located ("storage devices 11. Control transfers to block 62 which represents the host system 2 determining whether the recall request is to a volume on a mounted cartridge to which the host system 2 is currently performing recall

operations. If so, control transfers to block 64 which represents the host 2 placing the recall request in the recall queue 50", see column 6, lines 53 – 58), said requests forming first and second sequences, said first sequence preceding said second sequence in said queue with respect to said order, wherein the offsets of the requests within said first sequence are a maximally monotonically increasing series ("The recall operation for the next recall request to the first storage device is performed after determining that the next recall request has the higher priority. The first storage device is demounted from the drive after determining that the recall request to the second storage device has the higher priority", see column 2, lines 64 – 67 and column 3, lines 1 – 2);

Le and Pence do not explicitly teach determining the location of said reading head along said medium; determining that the location of said reading head is beyond said first offset; inserting said new request into said queue into a position that, with respect to said order, is subsequent to said first sequence.

Cabrera teaches determining the location of said reading head along said medium ("A memory location or register 300 stores the address of the buffer header located at the beginning to the LRU queue (i.e., the LRU header 302). In an alternative embodiment, another memory location or register (not shown) stores the address of the buffer header at the end of the LRU queue (i.e., the MRU header 310). Such memory locations or registers are updated as the buffer headers are removed and inserted into the queue 301", see column 7, lines 39 – 46);

determining that the location of said reading head ("memory locations or registers are updated as the buffer headers", see column 7, lines 45 – 46) is beyond said first offset ("a file offset", see column 9, line 32);

inserting said new request into said queue into a position that, with respect to said order, is subsequent to said first sequence ("To insert a new buffer header into the hash queue structure, the appropriate doubly linked list is traversed to locate the proper insertion point in the queue", see column 8, lines 52 – 55).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified teaching of Le and Pence combine with the teaching of Cabrera wherein servicing the recall data request received by a request processing module, a retrieval module locates the requested data in a logical data unit (e.g., a data block) of the secondary storage device and transfers the logical data unit to an available data buffer. Locating the proper insertion point of new recall request is efficient and easy due to the ordered linked list.

Regarding claim 17, Le teaches the offsets of the requests within said second sequence area maximally monotonically increasing series ("allocating he non-volatile storage device to the second host system to process the second host recall request after determining that the non-volatile storage device is available and that the priority of the second host call request is greater than or equal to the priority data indicated in the data structure", see column 14, lines 51 – 56).

Regarding claim 18, Cabrera teaches the position in said second sequence in which said new request is inserted is based on said first offset, such that the monotonically increasing nature of said second sequence is preserved following the insertion ("After a new data transfer, the file-based identifier associated with the new data is loaded in the buffer header, which is then is re-inserted at the end of the least-recently-used queue and reorganized within the hash queue structure according to the new file-based identifier", see column 8, lines 16 – 22; "To insert a new buffer header into the hash queue structure, the appropriate doubly linked list is traversed to locate the proper insertion point in the queue", column 8, lines 52 – 55).

Regarding claim 19, Cabrera teaches selecting, from among a plurality of queues, a particular queue into which to insert said new request ("To insert a new buffer header into the hash queue structure, the appropriate doubly linked list is traversed to locate the proper insertion point in the queue", see column 8, lines 52 – 55), wherein each one of said plurality of queues corresponds to a different medium ("It should be noted that the hash queue structure 400 may include empty queues (such as the queue corresponding to Hash Index i.sub.3), if no header having a file-based identifier corresponding to that queue has been inserted", column 8, lines 57 – 58), the selection being based on the particular medium on which the data object is located ("The data buffer 312, which is associated with the LRU buffer header 302 at the beginning of the queue, is selected by a selection module to receive the transferred data from the secondary storage device", column 7, lines 57 – 60).

Claims 20 is essentially the same as claim 16 except that it sets forth the claimed invention as a computer-readable medium having computer-executable instructions rather than a method and therefore rejected for the same reasons as applied hereinabove.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred I. Ehichioya whose telephone number is 703-305-8039. The examiner can normally be reached on M - F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached on 703-305-4393. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-303-3900.

FE
March 8, 2003

KIM VU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100